

REMARKS

Applicant is amending the claims as set forth above to better define the invention. Applicant appreciates the indication of allowance of claim 17, if amended to become independent, incorporating the requirements of the base claim and any intervening claims. Applicant has consequently amended claim 17 and made a number of dependent claims depend from claim 17. Applicant believes that the examiner inadvertently failed to examiner claims 27-29. In the election without traverse, applicant elected Group II, claims 12-25 and claims 27-39. Claims 27-39 clearly deal with the same subject matter as claims 12-25. Applicant has also added some new claims to replace claims canceled. Applicant respectfully traverses the rejection of the remaining claims over the cited art and respectfully requests reconsideration.

Claim 41, which replaced claim 12, requires that each of the mold elements have a plurality of elongated slots. Referring to the drawings of this application by way of example and not in a limiting manner, Figure 5 shows the slots in each mold element 107 and 108. The inner ends 112 of the mold elements abut. The claim requires that each slot extend along the sidewall and have an opening at the mold element inner end 112 and a termination spaced from the inner end 112. Claim 41 requires that the mold elements 107, 108 have their inner ends in abutment with each other, which is shown in Figure 5, such that the openings of the slots at inner ends 112 mate to define elongated mold cavities.

Referring to Figure 1 of Benteler 4,319,471, a plurality of mold elements 40 is stacked together. Each mold element 40 is split, having two halves, and is contained in one of the segments of a clamping jaw 30. Each mold elements 40 has a single concave semi-cylindrical recess within its inner diameter. The mold elements do not have a plurality of slots as required by claim 41. As shown in Figure 2, the operator inserts a tubular work piece between the mating halves of the mold elements 40, then clamps the jaw 30 together. Applying fluid pressure to the interior of the tubular work piece causes the sidewalls of the tube to deform outward, resulting in circumferentially extending corrugations.

Claim 41 also requires inserting a mandrel into the tubular work piece and through the mold elements. Referring to Figure 6 of this application, mandrel 101 is inserted into the interior of workpiece 102 and through mold elements 107, 108. The mandrels 26 and 13 in Benteler do not locate within the interior of the mold elements 40, as required by claim 41. Rather, mold elements 40 are located at opposite ends of clamping jaw 30.

Step (g) of claim 41 requires sliding the mold elements in opposite axial directions relative to each other to remove them from the workpiece. In Benteler, mold elements 40 do not slide in opposite axial directions to remove them from the tubular work piece. Rather the work piece is accessed by opening the clamping jaws as shown in Figure 2. By requiring axial movement in order to remove the mold elements, applicant is able to utilize unitary cylindrical mold elements, rather than being split as shown in Benteler. In order to form centralizers as in this application, high fluid pressure is required, which would require a very large clamp if the molds were split as in Benteler. Split molds as in Benteler might also cause axially extending seams to appear in the centralizer being formed.

Claim 42 depends from claim 41 specifying that the chamber of the housing assembly has a cylindrical inner diameter and a chamber axis. It requires inserting the mold elements and the work piece along the chamber axis into the chamber. It requires withdrawing the mold elements and the work piece along the chamber axis. This cannot be done in the arrangement in Benteler.

Claim 43 requires providing each of the mold elements with an axial length greater than an inner diameter of each of the mold elements. In Benteler, the mold elements have very short axial lengths relative to the inner diameter.

Claim 44 specifies that the housing assembly comprises a bell and a collet located within the bell, the collet and the bell having tapered mating surfaces. Benteler does not show a collet. Claim 44 further specifies that the collet, the mold elements, and the workpiece are withdrawn from the bell.

Claim 45 requires that the mold elements contain axially extending slits. The mold elements 40 in Benteler do not have axial extending slits.

Claim 46 specifies that the chamber of the housing have opposite open ends. It requires that the mandrel protrude from both ends of the chamber. This arrangement is illustrated in Figure 6. The chamber within jaws 30 of Benteler does not have a mandrel protruding from opposite ends. Mandrels 26 and 11 are located in the chamber.

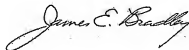
Claim 27 requires two mold elements, each having a plurality of slots, each slot having a length extending toward the outer end of the mold element. It requires that each slot have an opening at the inner end. It requires that the mold elements be positioned on the tubular workpiece in abutment with each other, with the openings of the slots registering with each other to define cavities with perimeters shaped like ribs. Claim 27 requires inserting the mold elements along the chamber axis into the chamber of the bell. It requires removing the centralizer and mold elements from the bell while moving the centralizer and the mold elements along the chamber axis. It requires removing the mold elements from the centralizer by sliding the mold elements in opposite axial directions relative to a longitudinal axis of the centralizer. In Benteler, the steps mentioned above are not met as discussed previously.

Marando discusses forming a helical rib in concentric tubes 12, 14. The tubes are positioned in a cavity formed by upper and lower molds 18, 20 and fluid pressure is applied to deform the tubes. After deforming, the molds 18, 20 may be pulled apart from each other in a direction perpendicular to the axis of the cavity. Mold elements 18, 20 do not have inner ends that abut each other. Marando does not suggest the use of mold elements that can be pulled axially apart from each other. Marando does not suggest a plurality of slots in the sidewall of the mold elements 18, 20, the slots having openings at the inner ends of the mold elements that register with each other to define a cavity in the shape of a centralizer rib. Combining Benteler with Marando would not meet the requirements of these claims.

Williamson 6,092,593 was cited for the purpose of treating the exterior surfaces of the ribs to increase their wear resistance. Kirk US 2003/0010540 was cited for the purpose of a low friction coating to the inner surface of the centralizer. These references do not suggest the requirements discussed above.

It is respectfully submitted that the claims are now in condition for allowance and favorable action is respectfully requested.

Respectfully submitted,



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